



Regional Planning for Sea-Level Rise in Hampton Roads

Norfolk Flooding Task Force Meeting
February 29, 2012



Benjamin McFarlane, AICP
Regional Planner

What is the HRPDC?

- ❑ 1 of 21 Regional Planning Agencies
- ❑ State enabled; locally created
- ❑ 16 Cities & Counties; several Towns; 1.7 million people; 3,000 square miles; 5,000 miles shoreline
- ❑ Commission – 45 local elected officials & CAO
- ❑ Staff – Executive Director & 45 staff
- ❑ Funding – Local contributions, grants, and contracts
- ❑ Functions – Economics, Housing, Transportation, Environmental, Emergency Management
- ❑ Budget \$12,000,000 +
- ❑ Role – Policy & Technical Analysis, Planning & Engineering Studies, Cooperative Problem Solving, Coordination



What does HRPDC do?

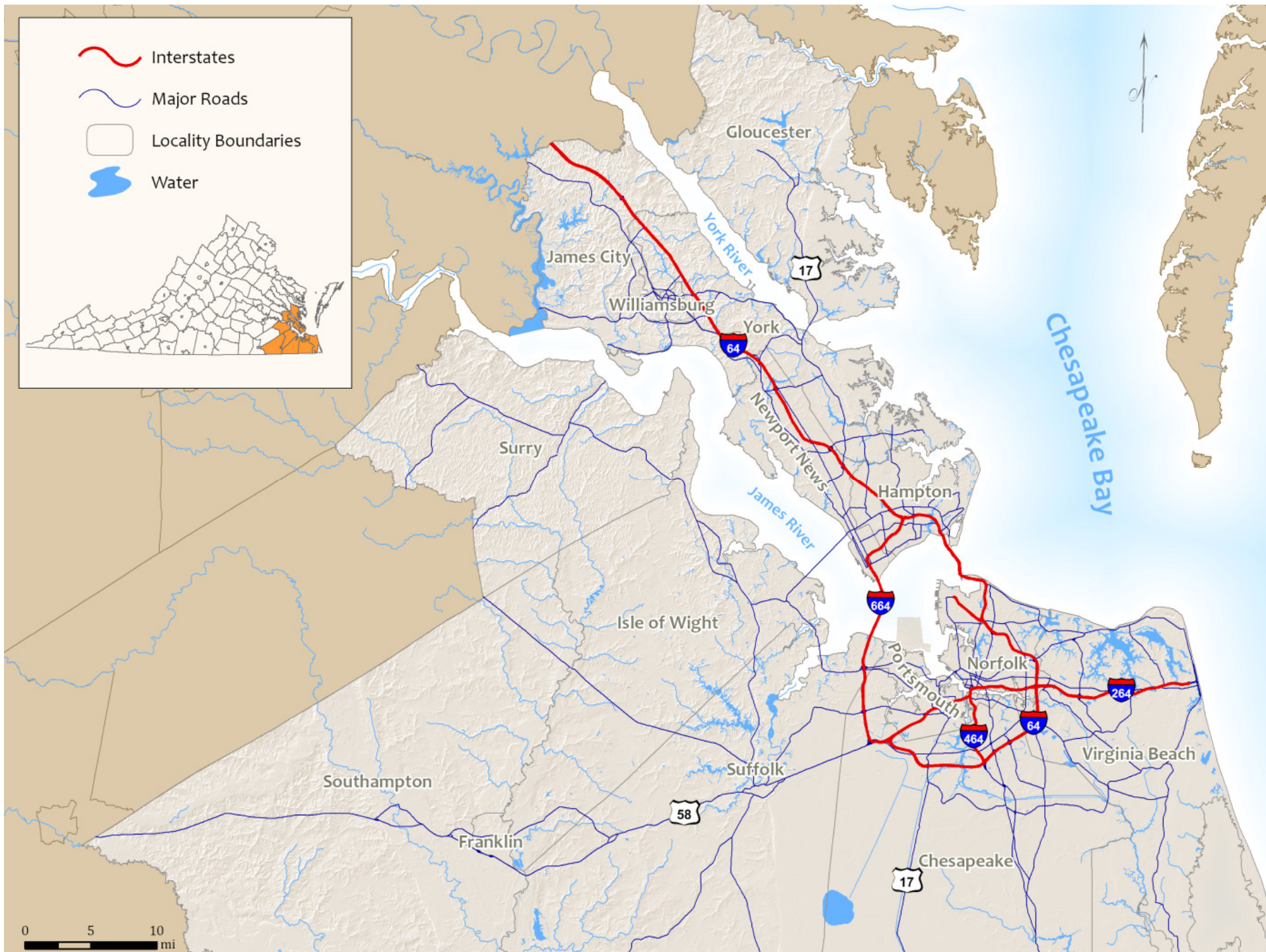
- The Commission:

- “**serves as a forum** for local and elected officials and chief administrators to **deliberate** and **decide** issues of **regional importance**”

- The Staff:

- “provides the local governments and citizens of Hampton Roads credible and timely **planning, research, and analysis** on matters of mutual concern, and”
- “**provides leadership and offers strategies and support services** to other public and private, local, and regional agencies, in their efforts to improve the region’s quality of life.”





HRPDC Climate Change Initiative

- Since 2008, HRPDC has received focal area grant funding from the Virginia Coastal Zone Management Program to study how climate change will affect Hampton Roads.
- HRPDC has collaborated with the Northern Virginia Regional Commission and the Middle Peninsula Planning District Commission to share knowledge and practices.
- This three-year grant project is nearly finished.



HRPDC Climate Change Initiative

6

- Year 1: Begin stakeholder process and identify broad impacts of climate change on Hampton Roads
- Year 2: Assessment of impacts and development of policy recommendations
- Year 3: Analysis of infrastructure and economic impacts and developing a regional framework for mitigation and adaptation to climate change



HRPDC Climate Change Initiative

7

□ Three parts:

1. Coordination
2. Outreach
3. Research and Analysis



Coordination

8

- Working with other organizations and institutions to promote awareness of sea level rise and flooding issues in Hampton Roads
- ODU Initiative
- UVA-CRMES: Vulnerability of transportation infrastructure
- ODU: Economic impacts of flooding and sea level rise
- Storm Surge modeling with VIMS



Outreach

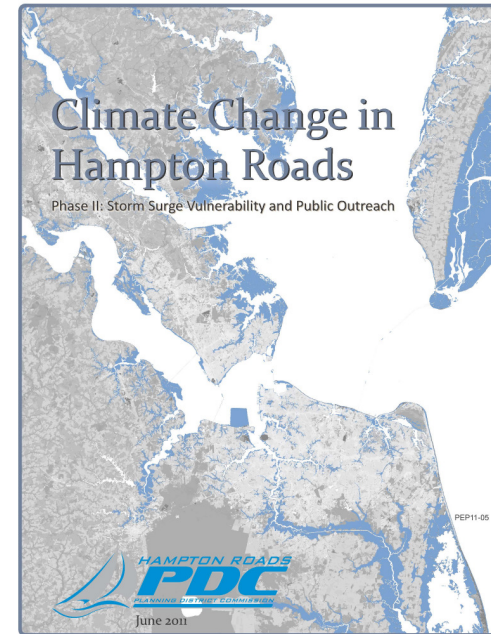
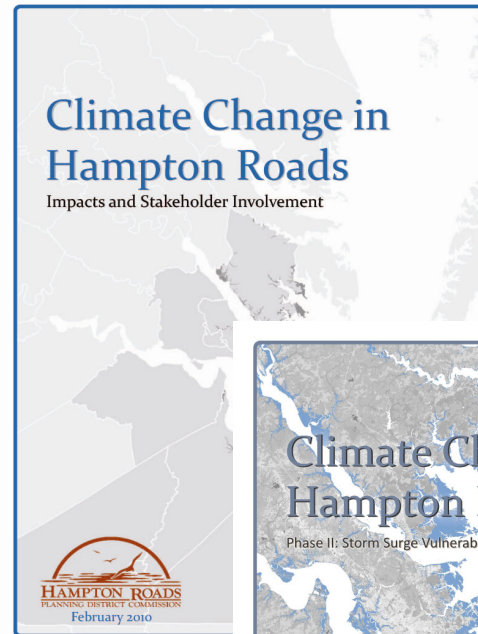
9

- Engaging local governments, citizens, and stakeholders through public meetings
- UVA-IEN/Wetlands Watch: Listening sessions in Virginia Beach
- Other public meetings to city councils and citizen groups

Research and Analysis

10

- Year 1: Natural Resources focus
- Year 2: Storm Surge Exposure



Current Work

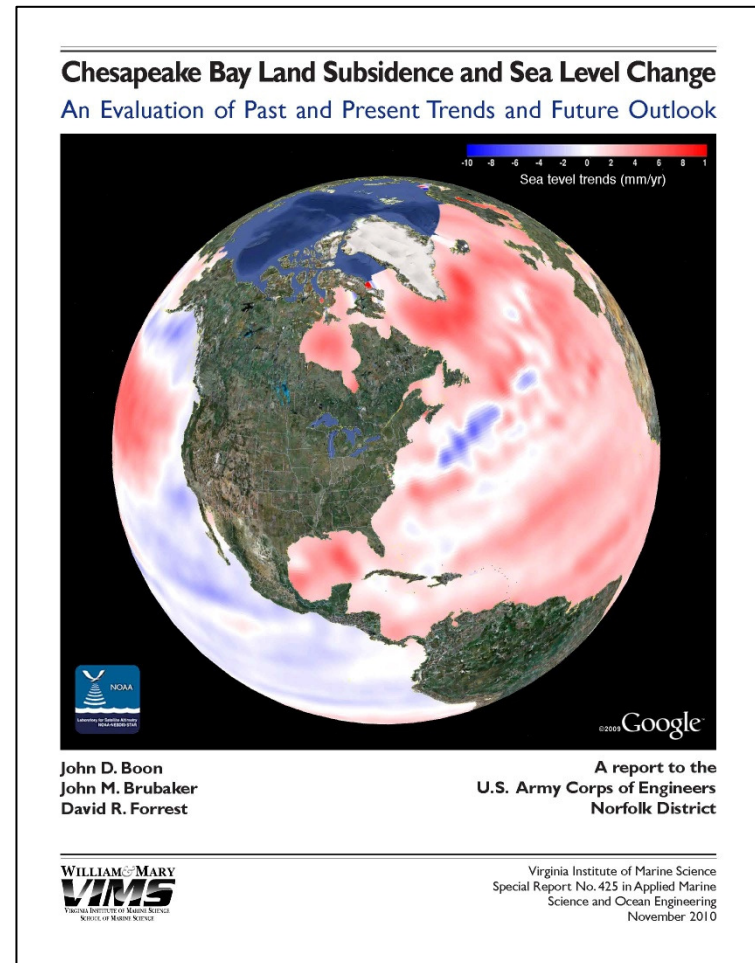
11

- Finishing Year 3 report
 - ▣ Sea Level Rise Vulnerability Analysis
 - ▣ Recommendations on how to plan for sea level rise
 - ▣ Future research needs
 - Subsidence
 - Elevation
 - Sea level
 - ▣ Anticipated delivery in March/April 2012
- 1-year VCZMP grant to study how to plan for sea level rise and climate change using an adaptive management approach
 - ▣ Incorporating climate change into existing planning processes and policies

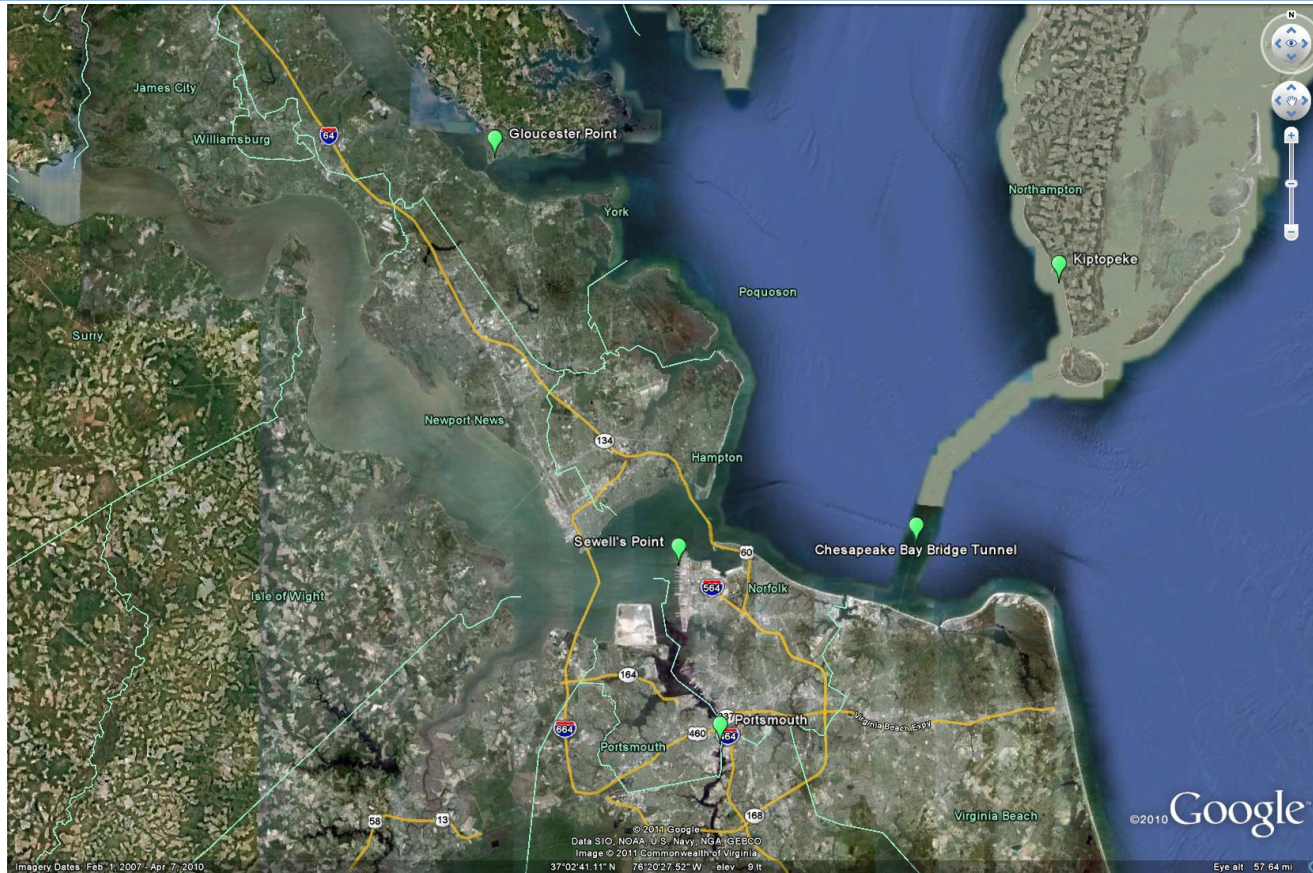


What is Sea Level Rise?

- Sea level rise is both global and local
- Global sea level rise caused by combination of thermal expansion and melting ice (considerable uncertainty with latter)
- Local sea level rise affected by ocean currents, winds, and subsidence
- Observed SLR of 4.42 mm/yr at Sewell's Point since 1927
- Sea level trends vary by location



NOAA Tide Stations



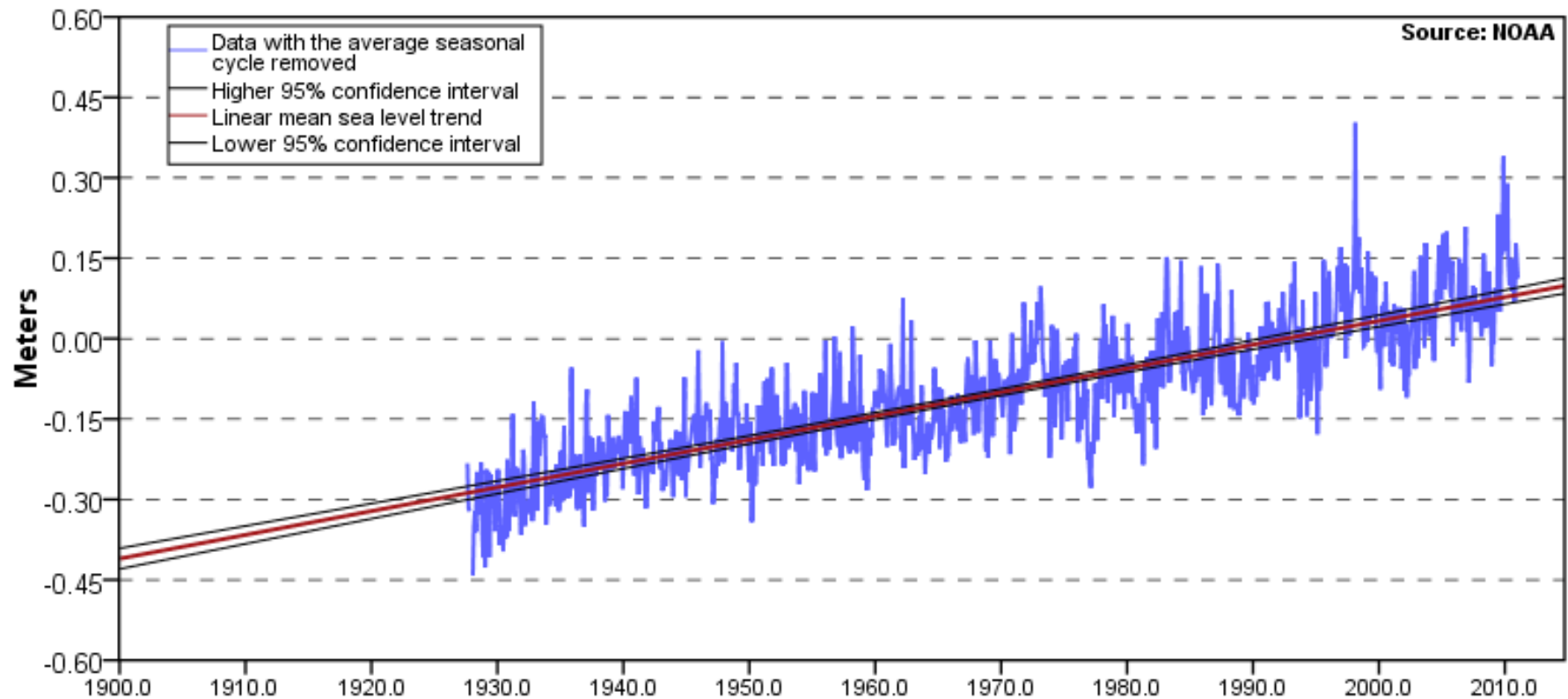
NOAA Tide Stations in Hampton Roads that measure sea level trends



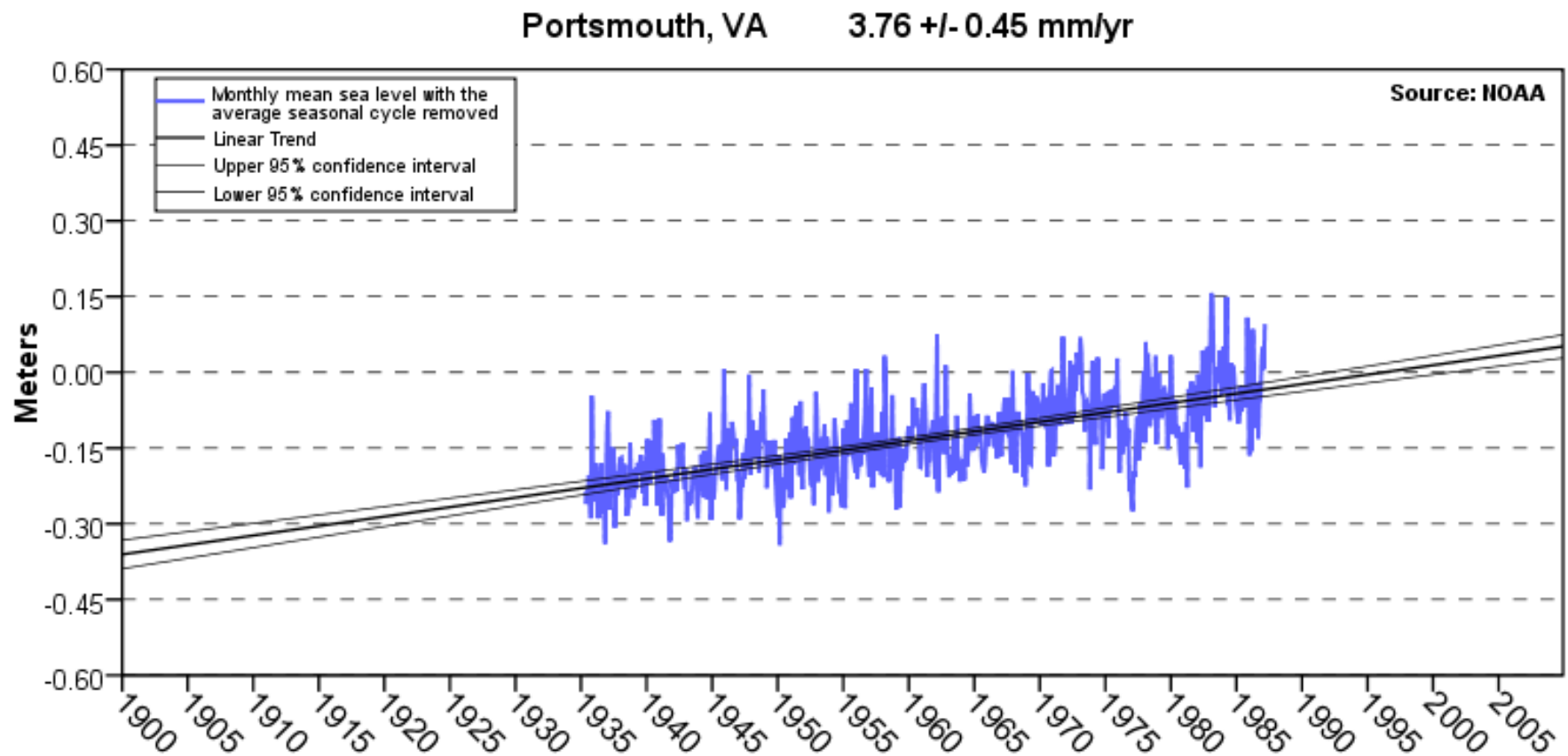
www.tidesandcurrents.noaa.gov

Norfolk, VA

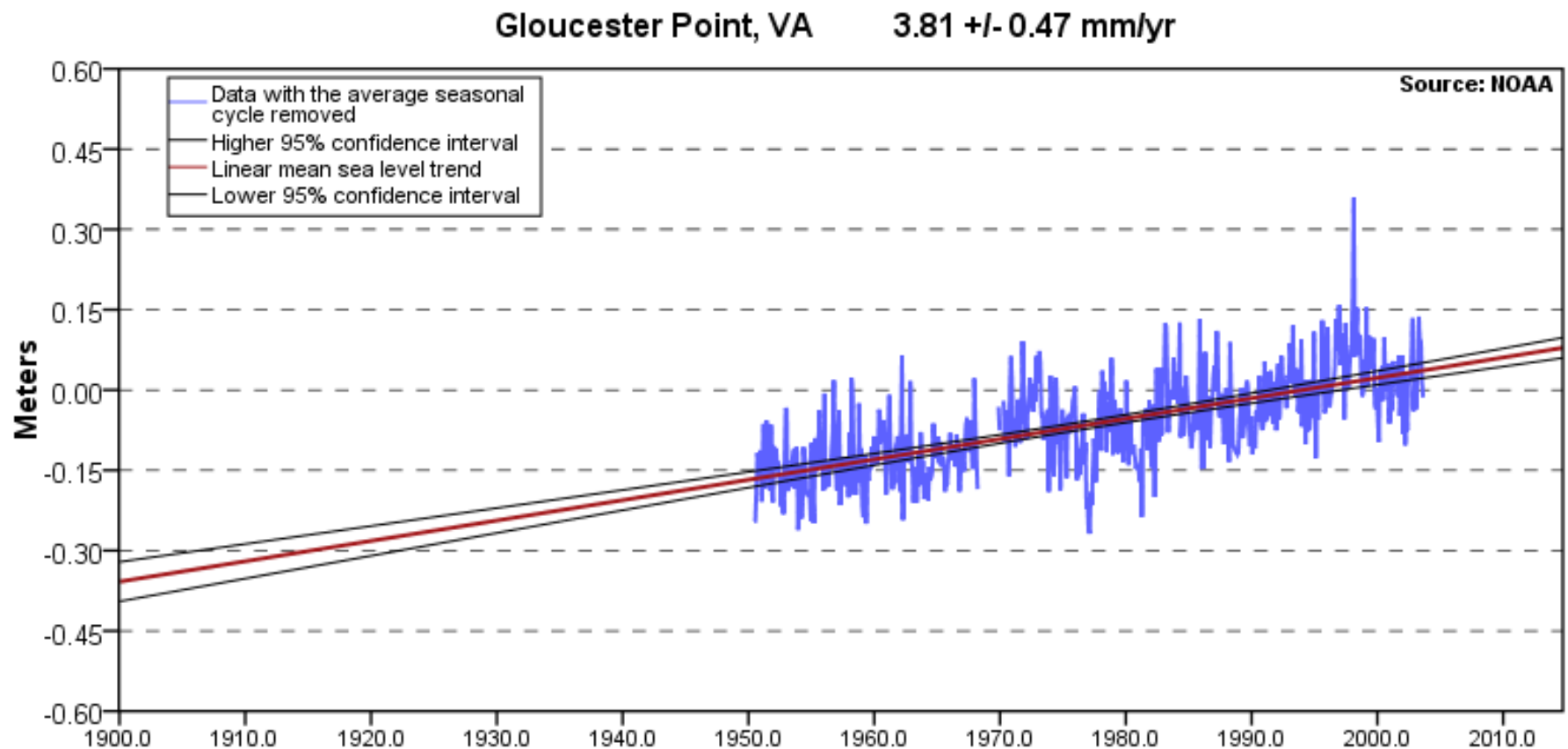
Sewells Point, VA 4.44 ± 0.27 mm/yr



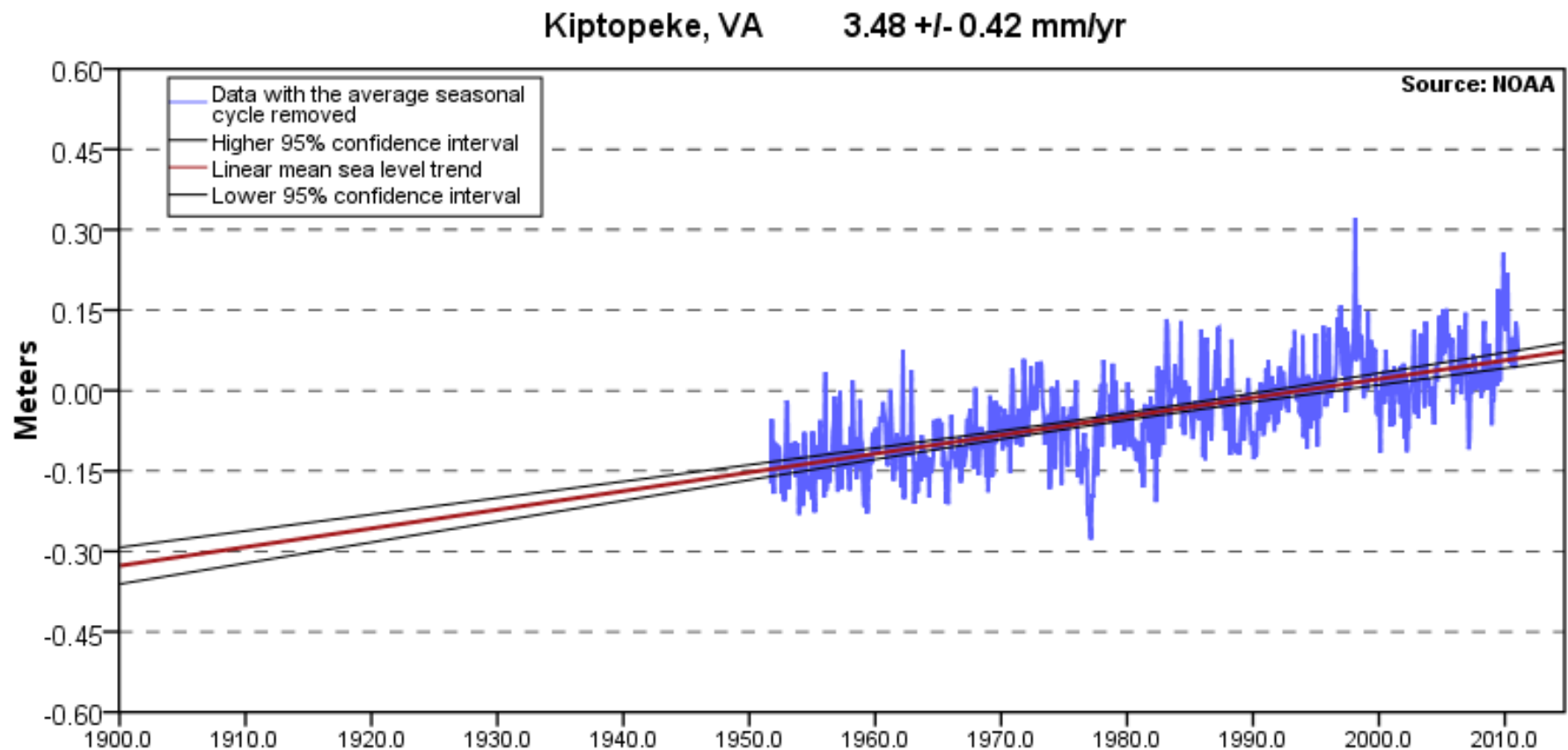
Portsmouth, VA



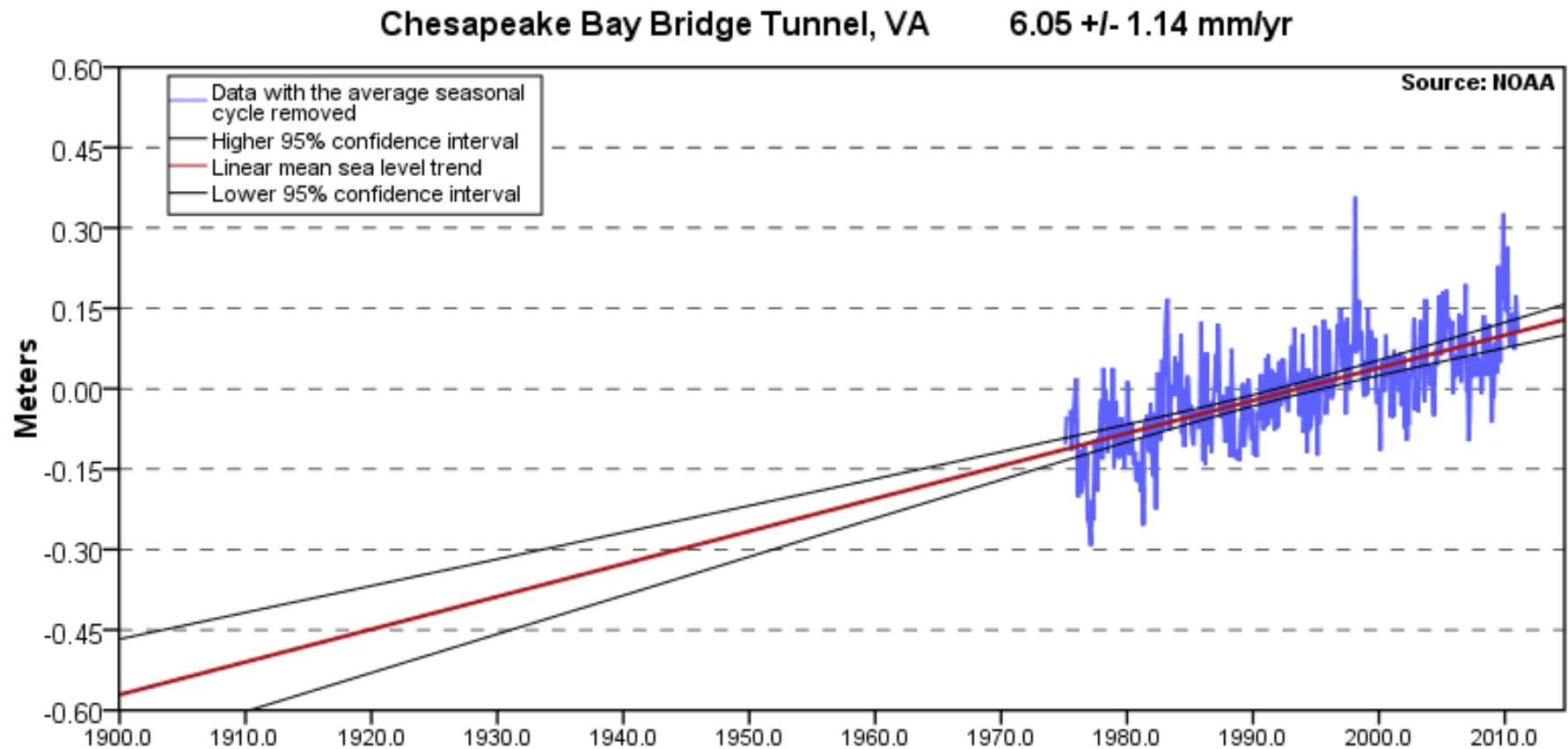
Gloucester County, VA



Northampton County, VA



Chesapeake Bay



Future Sea Level Rise

- Future sea level rise will depend on many factors, especially greenhouse gas emissions
- IPCC: 0.21-0.48m (8-19 inches) global sea level rise by 2100
- Chesapeake Bay Program: 0.7-1.6m (2.3 – 5.2 feet) along the Chesapeake Bay by 2100

Uncertainty

- There are many uncertainties to be aware of when planning for sea level rise
 - ▣ Future conditions (emissions) will affect how fast sea level rises
 - ▣ Shorelines will change in response to erosion
- There are also things we just do not know very well
 - ▣ Subsidence rates and causes
 - ▣ Underlying land elevations

Planning for Sea Level Rise

- Given these uncertainties, how do we effectively plan for sea level rise?
 - ▣ Identify areas vulnerable to current or future flooding based on existing conditions or projected sea level rise
 - ▣ Establish policies to protect those areas or divert development towards less vulnerable areas
 - Flood mitigation policies, transfer of development rights, rolling easements
 - ▣ Design and build structures to survive under the conditions it will experience during its lifetime
- “No Regrets” policies

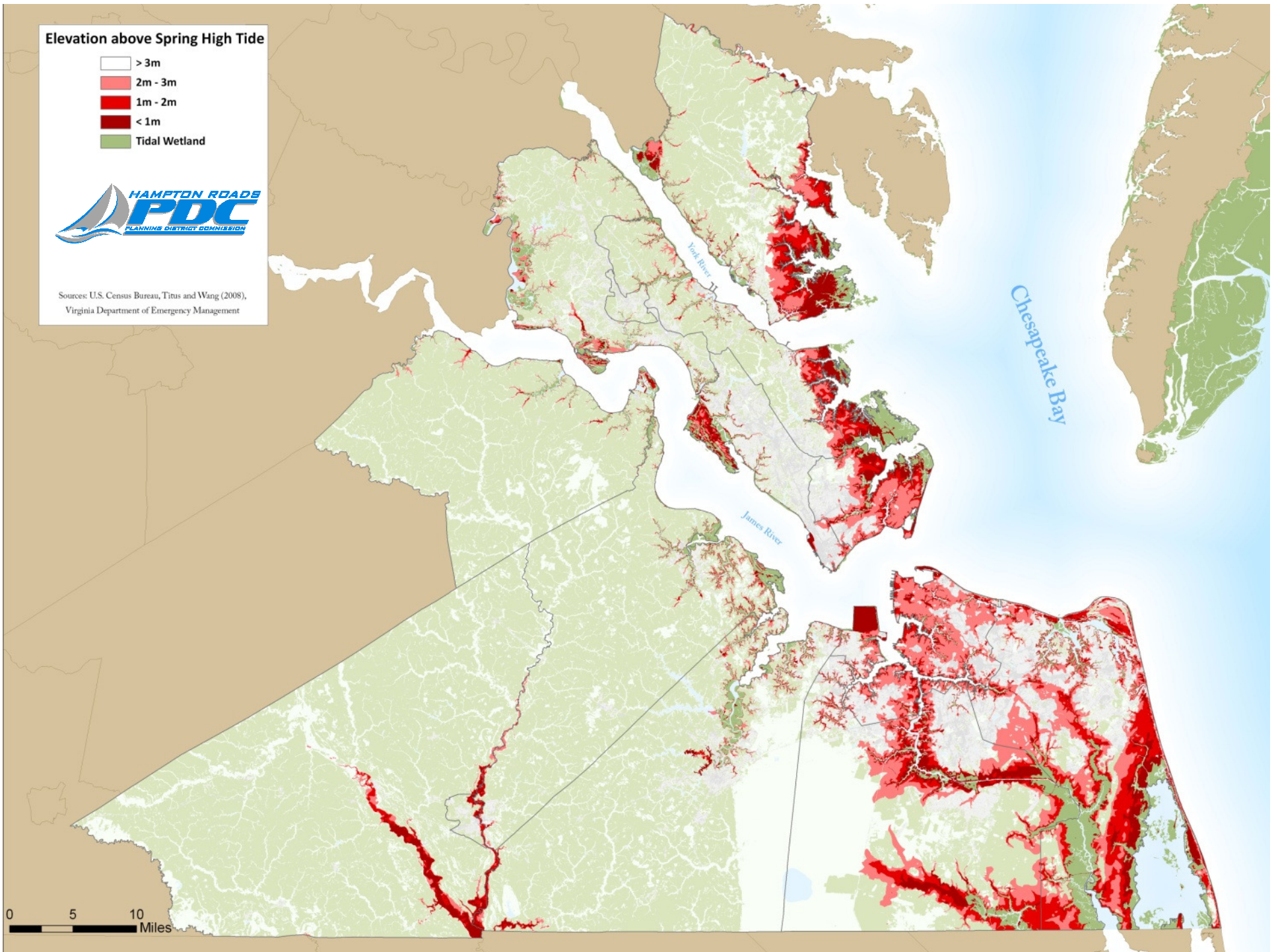


Elevation above Spring High Tide

- > 3m
- 2m - 3m
- 1m - 2m
- < 1m
- Tidal Wetland



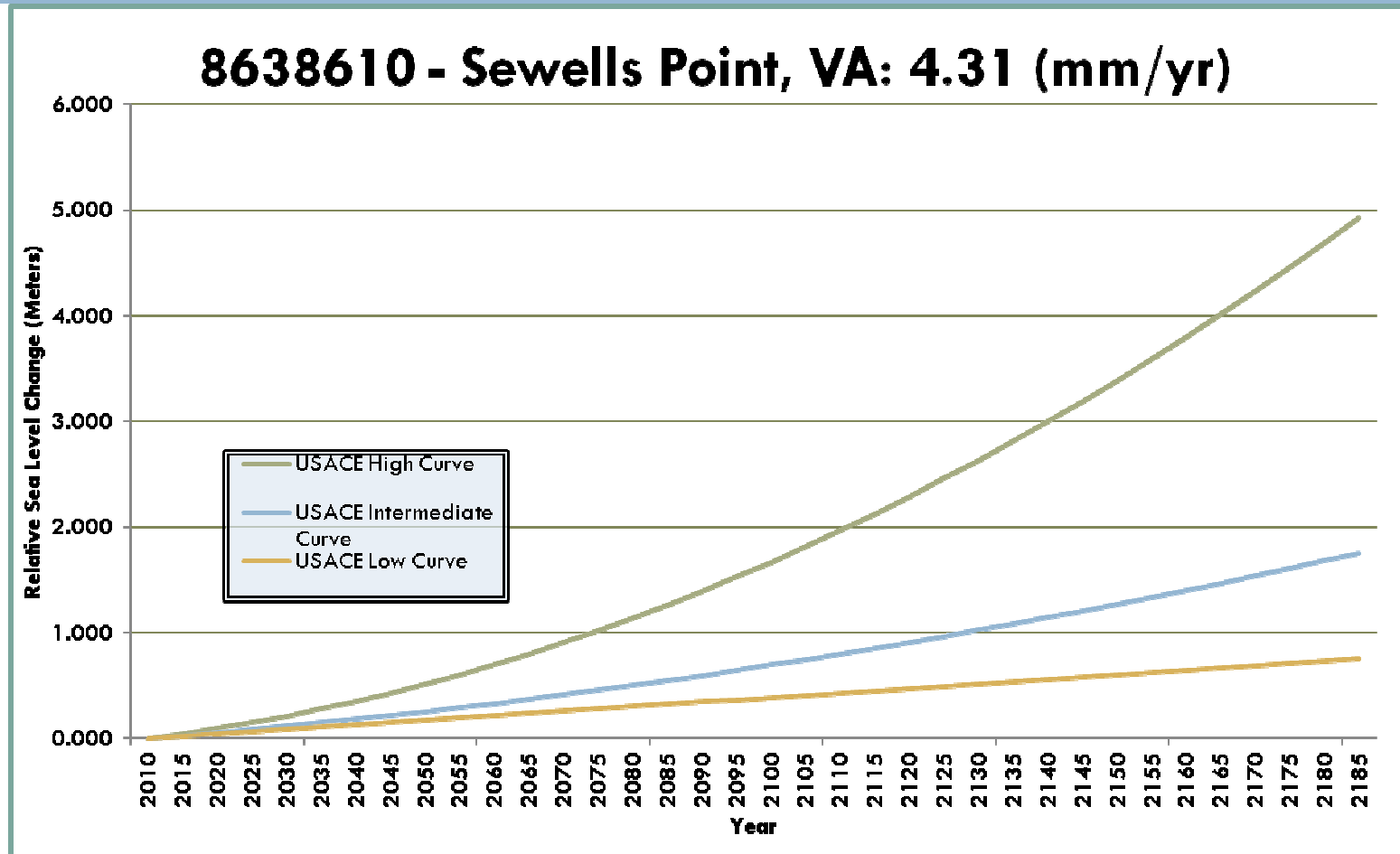
Sources: U.S. Census Bureau, Titus and Wang (2008),
Virginia Department of Emergency Management



Planning for Sea Level Rise

- Design structures to be adaptable (as conditions change, can alter them without having to completely rebuild)
- Use scenario planning to identify likely scenarios of future conditions and incorporate into cost-benefit analyses
 - ▣ U.S. Army Corps of Engineers Guidance

Planning for Sea Level Rise



Benjamin J. McFarlane, AICP
Regional Planner
Hampton Roads Planning District Commission
bmcfarlane@hrpdcva.gov

